AN ANALYSIS OF INJURIES IN THE INDUSTRIAL ARTS WOODSHOP

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INTRODUCTION

"Too many of our nation's students have been needlessly crippled in shop accidents," states Pyle (1972, p. 47). A good safety program based on teacher instruction could have reduced these shop accidents. It is very difficult to create an accident prevention program without first knowing where the accidents occur.

The Occupational Safety and Health Act (OSHA) was signed into law in December, 1970 and took effect in 1971. Its main purpose is to assure safe healthful working conditions for every working man and woman. Unfortunately, the act does not protect the high school student. There is no federal law or institution that governs the safety of high school woodshops. Each state has its own set of laws and standards that apply to the high school woodshop.

The health and welfare of the individual is one of the main interests of society. Accident prevention programs have been developed for almost every facet of life, with a considerable amount of data on accident and injuries in most areas of industry. There is plenty of information concerning accident prevention for the woodshop teacher. However, there is little information concerning woodshop injuries available at this time.

The teacher education programs emphasize accident prevention, but exclude where or when the accidents or injuries are occurring most

often in the woodshop. Information on accidents and injuries would help all teachers become safer and help them develop more practical programs.

Statement of the problem

If industrial arts woodshop teachers are to design the best possible accident prevention program, they need to know what situations cause the most injuries. This needed information is not readily available to the teacher. There are however, many accident prevention programs designed for the use of the woodshop teacher. If adequate safety concepts and practices are to be learned more information about accidents and injuries must be gained to facilitate a good safety program based upon adequate instruction. "One of the outstanding weaknesses of present school safety programs is the failure to keep written records of accidents" (McElmurry, 1977, p. 2). Because of the lack of records, the industrial arts woodworking teachers do not have enough information on accidents and injuries that occur in the woodshop.

Purpose of the Study

The purpose of this study was to determine what machine or tool is involved in the most injuries and the time of year and class level that injuries occur most often in high school industrial arts woodshops. It also was the intent of this study to determine the type of injury that most often occurs in the woodshop.

Research Questions

Based on the purpose of this study, the following research questions

were developed as guides in the collection and analysis of data:

1. What machine, tool, or situation is involved in the injury of most students in the industrial arts woodshop?

2. What type of injury occurs most often in the high school industrial arts woodshops?

3. What time of year do most injuries occur in the high school industrial arts woodshop?

4. In what level of class do most injuries occur in the high school industrial arts woodshops (Woodshop I, Woodshop II, etc.)?

5. In what size schools do most injuries occur in the high school industrial arts woodshop (small schools, medium size schools, or large schools)?

Scope of the Problem

This study included 126 industrial arts high school woodshops in three states. A stratified random sample was used in the hope to make the study representative of the population.

Definition of Terms

The following definitions are used in this study:

High school industrial arts woodshop class: A nonvocational woodworking class in grades nine-12.

Fatal Injury: An injury that is directly responsible for the death of a student while in the woodshop.

Catastrophic Injury: An injury that is directly responsible for loss of function or permanent damage of a body part (arm, finger, eye, etc.) while in the woodshop.

Serious Injury: An injury obtained in woodshop class requiring out-of-school medical attention (broken bone, stiches, etc.).

Minor Injury: An injury obtained in woodshop class requiring in-school first aid (cut, scratch, etc.).

Assumptions

This study was based upon the following assumptions:

1. It was assumed that the 126 schools sampled were representative of other schools in the United States.

2. It was assumed that responses were made deliberately and sincerely.

3. It is assumed that all classes were one school year in length.

4. It was assumed that the number of machines is not instrumental to the number of accidents.

5. It is assumed that all schools sampled kept accident records.

CHAPTER II

REVIEW OF THE LITERATURE

The purpose of this study was to obtain information about injuries that occur in high school industrial arts woodshop classes. Safety education and accident prevention are becoming some of the most important functions of the woodshop teacher. The Williams-Steigler Occupational Safety and Health Act (OSHA) was enacted by the 91st Congress and took effect April, 1971. Its expressed purpose is to assure every working person a safe and healthful working environment. However, this act did not directly affect the school shop.

OSHA is a set of standards that industry is required to meet. However, these standards do not in themself assure a safe and healthful work place. Wolf (1976, p. 66) states there are two reasons for the inadequatcies in OSHA. "(1) the OSHA standards do not and never can adequately cover every situation, and (2) the unsafe act remains the most important single factor contributing to accident experience."

Williams (1972) identifies the persons responsible for safety in the school in the following quote:

> When school administrators undertake the obligation to providing shop and laboratory experiences for youths and adults enrolled in thier schools, they accept the responsibility of providing a program of education which will emphasize effective safety practices in an accident-free environment. The brunt of such a responsibility is delegated to the teacher, who must strive to prevent accidents which might result in injury or harm to students,

> or other personnel or visitors, or which might damage equipment and facilities (p. 48).

A pragmatic definition of accident is "physical proof of error" (Pfister, 1972, p. 58). An accident can then be defined as a positive indication of man's failure to cope successfully with a given environment. Firenze and Walters (1981) defines an accident as it pertains to school shops as:

> Any unexpected event which interrupts the normal shop education process, caused by human, situational or environmental factors or a combination of these. It may or may not result in death, injury or property damage but has the potential to do so (p. 1).

Accidents are caused by hazards. A workable definition of a hazard as stated by Firenze and Walters (1981) is:

> Any existing or potential condition in the wookplace which, by itself or interacting with other variables, can result in unwanted effects or property damage, illness, injuries, deaths, and other losses (p. 1).

Hazards are generally grouped into two categories: those dealing with safety (i.e. injuries) and those dealing with health (i.e. illness). The focus of this study is on injuries that occur from these different hazards.

One only has to look at the statistics to realize that the need exists for injury evaluation and safety education. The National Safety Council prints in its Accident Facts (1981) that accidents claim more lives than the six leading causes of death to children between the ages of one to 14 and more lives than all other causes combined for 15 to 24 years old. Each year nearly 7,500 teachers require medical attention from on-the-job accidents; a teacher is twice as likely to get injured in the classroom as are steel mill workers (McPherson, 1977).

Accident Prevention

Nichols (1972, p. 83) states, "Although a vast amount of research has been conducted on accidents in industry, such effort has not been paralled in studying accidents in educational laboratories." It is the responsibility of the teacher and administration to develop their own accident prevention program.

The industrial arts teachers are part of a small group of educators in the position to help form positive safety attitudes that are essential in the world of work. The developing attitudes of high school students are by far the most important psychological aspect of safety in any endeavor. A study of these aspects lead directly to the psychological factors related to the human behavior. The development of positive attitudes toward safety can take place only in a safe environment; therefore, it is necessary for the industrial arts teacher to set a positive example of safety (Krejcie, 1972).

It is very important that a school develop an accident prevention program if the number of injuries are to be reduced. Firenze and Walters (1981, p. 1) report that, "perhaps the key person from the standpoint of his day-to-day contact with the shop and students, is the instructor. Through his active leadership and participation, this person makes the program happen." Another factor to consider when designing an accident prevention program is the age of the students. "Following the lead of industry is not enough when it comes to safety of youth. Industry is not employing the 14-17 year olds" (Pfister, 1972, p. 58).

Accident prevention programs do not have to be complex. Through

proper use, maintenance, and guarding of machines the likelihood of accidents will decrease. Lutz (1981, p. 26) comments that it may be helpful for the teacher to break down the general goal of using tools safely into the following components, "(1) knowing the proper use and limitations of the tool or machine; (2) demonstrating a degree of operating skills and exhibiting a respectful attitude to others."

There is a direct relation between students' attitudes and accidents. it is very important that the accident prevention programs try to improve the students' attitudes toward safety. According to Smith (1978) the use of the following eight concepts will promote positive attitudes toward safety in students.

> Concept 1. At all times only the minimum amount of blade or cutter required to do the job should be exposed.
>
> Concept 2. Whenever possible, the guard for the machine must be utilized if it does not pose a hindrance to the operator.
>
> Concept 3. All machines have physical limitations. If exceeded, they will not only overload the machine, but also pose a threat to the operator.
>
> Concept 4. Whenever one is performing specialty operations (other than those for which the machine was primarily designed) the operator must be extremely aware of safety procedures.
>
> Concept 5. For one's protection, it is necessary to wear and use the appropriate safety apparel and utensils.
>
> Concept 6. If for any reason a malfunction occurs, the piece of equipment involved must be turned off until the correction is made.
>
> Concept 7. Machines designed for one operator must be operated by one person only unless another person is required for the purpose of instruction or for some type of assistance.
>
> Concept 8. Any adjustment of a machine must be made with the machine off, unless the machine's instruction manual designates otherwise (p. 43).

It is difficult to test the students' attitudes toward safety. It is possible to test the students knowledge and comprehension of safety rules and practices.

The Oklahoma State Board of Vocational and Technical Education in its Accident Prevention for Industrial Arts, Vocational and Technical Education Programs (ND, p. 26) "each student enrolled in an industrial education class should be required to take a safety test on the tool, machinery, equipment, and supplies applicable to that instructional area." A safety test is a system for evaluating each students grasp of safety rules and concepts. According to the Oklahoma State Board of Vocational and Technical Education (ND, p. 26) "students should not be allowed to use machines or equipment until the safety test has been passed with a score of 100 percent."

Safety tests should be comprehensive and include only important safety concepts. Teachers may develop their own safety tests or use ones already published (Lutz, 1972).

Lutz (1972, p. 27) states, "being accountable for the safety of students in a laboratory seems to demand a procedure that provides written evidence, which identifies the level of awareness of each student." Safety tests can provide this evidence. The Oklahoma State Board of Vocational and Technical Education expands this concept as follows:

> A pledge is something given as a security for the performance of an act and, usually, liable to forfeiture in case of non-performance; a guaranty. In the field of industrial education, it is the instructor's responsibility to administer to students the safety rules to be observed in his/her shop and in the operation of machiens. Be sure the student understands the rules, regulations, and procedures before taking the test. The student must make a passing grade to be recorded on the 'Pledge', and the test must be taken home for the parents to sign (ND, p. 26).

It is very important that all industrial arts shop teachers have a good accident prevention program that they use daily. There are a variety of accident prevention programs being used today by schools. Anderson (1971, p. 37) stated, "A few signs printed 'Danger' would be instructional and add an extra margin of safety."

Accident Reporting

According to McElmurry (1977) an organized system of accident reporting can contribute to the success of a safety program. The more facts that are available about accidents, the more reliable accident prevention programs will become.

Many good accident report forms exist for recording accident situations. Firenze and Walters (1981, p. 6-16) state that at least the following information about the accident must be reported.

1. Case number-The number assigned to each report for future identification and recall (e.g. 79-100).
2. Name of injured person
3. Date of injury.
4. Where accident happened-Specific place/area where accident occurred (e.g., machine shop/lathe area).
5. Nature of injury-Type of physical injury(e.g., cut, abrasion, and chemical burn).
6. Body part-The part of the body injured (e.g., left thigh).
7. Source of injury-The object, substance, exposure or body motion which directly produced the injury (e.g., saw plade).
8. Tools, equipment used-The tools, equipment or machine used when the accident occurred (e.g., metal lathe).
9. Time lost-The actual number of days and hours lost as a result of the accident.

10. Hazardous condition-The condition which directly caused the accident (e.g., oil spot on floor).

11. Human errors-The act of commission or omission which directly caused the accident (e.g., operating without authority, horseplay).

12. Instructor/supervisor-Person who was supervising student/staff/faculty member at time of accident.

13. Cost, medical, and other (p. 16).

McElmurry (1977, p. 6) says, "all accidents, no matter how minor can provide the basis for evaluating the effectiveness of an accident prevention program." He concluded that 70 percent of schools surveyed do not require a written report of accidents.

Safety inspections are a very important part of accident prevention. The purpose behind safety inspections are to correct the "hazards" before it causes an injury. McElmurry (1977) indicates that all schools should have periodic safety inspections conducted at regular intervals usually by a professional agency as well as continuous safety inspections by administrators, teachers and students.

The Result of Reporting Accidents

It is hard to find the information gathered by accident reports on specific injuries. There is no central agency that complies facts on shop injuries and publishes them for use by the industrial arts teacher. Compiled facts on injuries would help industrial arts teachers to design their accident prevention programs.

Andrews and Ericson (1960, p. 202) say, "it has been found that the larger number of accidents happen toward the close of the day." This suggests that extra care should be taken on the part of the instructor toward the end of the day when the students are tired.

Krejcie (1972) has identified the three phases of safety as follows:

> During the first phase the learner is cautious because he is not sure of himself and wants to do a good job. During the second phase the individual is proficient enough to be left alone; he knows what he is doing and no longer needs to be told how to do this job. Some people in this phase think they know it all, that they have found all the short cuts, and that they have nothing else to learn. During this second phase the individual could have, or be the cause of, a serious or fatal accident. Phase three identifies the person who has been through the mill, awakened to the fact that the graveyard is full of second phase characters who had little reguard for themselves or others (p. 60).

As instructors of safety, industrial arts teachers should be concerned with getting students through or around phase two in the shortest possible time and without injury.

McPherson (1977) cited the National Safety Council summarised reports of more than 35,000 student accidents occurring during the 1968-1969 school year. A total of 264,000 students in grades 10-12 were included in the report. Interscholastic football was the only type of activity that exceeded vocational and industrial arts in accident frequency. According to the National Safety Council statistics one out of 11 or approximately nine percent of the reported school accidents occurred in the shop. Machines and power equipment were involved in 60 percent of the accidents.

In a more recent study by the National Safety Council (1981) they state that about 25,000 males and about 1,400 females are injured in vocational and industrial arts shops each year. The study also indicated that over 2,300,000 workers disabled and over 13,000 are killed as a result of accidents occurring in the workplace.

Summary

Schools have a responsibility for the safety of its students and employees. This responsibility is both a moral and legal concern and should have its basis well rooted at the top administrative level. In the shop, it is the teacher's direct responsibility for the student's activity and safety.

The use of a good accident prevention program by teachers should help to minimize injuries in their shop. The accident prevention program should try to eliminate all hazards in the shop. The use of frequent shop inspections can aid in the reduction of hazards in the school shop. These inspections should be done by qualified personnel. Safety tests can be used to evaluate the students comprehension and knowledge of safety rules and practices.

Accident reporting is a major part of accident prevention. If every accident was reported, then teachers would have better information on which to base their accident prevention programs. Accident reports should include type of injury, time of day, time of year, grade, age of student and circumstances of the accident. This information may help the teacher and administrator improve their schools' safety record.

This study was designed to gain information about the specific injuries that occur in the woodshop. Chapter III will describe the method used to obtain the injury information.

CHAPTER III

METHODOLOGY

The purpose of this study was to obtain information about high school woodshop injuries in the past four years. Based on the purpose of this study, the following research questiosn were developed as a guide in the collection and analysis of data.

1. What machine, tool, or situation is involved in the injury of most students in the industrial arts woodshop?

2. What type of injury occurs most often in the high school industrial arts woodshop?

3. What time of year do most injuries occur in the high school industrial arts woodshop?

4. In what level of class do most injuries occur in the high school industrial arts woodshop (Woodshop I, Woodshop II, etc.)?

5. In what size schools do most injuries occur in the high school industrial arts woodshop (small schools, medium size schools, or large schools)?

Study Population and Sample

The population for this study was all of the industrial arts woodshop programs in the United States. For the purpose of selecting a study sample, a stratified random sample was used. Three states with different population characteristics were chosen. New Jersey, a densely

populated state, Oklahoma, a rural state and Indiana a mixture of both of the characteristics were chosen. The schools, in each state, were broken up into three stratas; small schools one-500 students, medium size schools 501-1,000 students and large schools 1,001 plus students. The schools in each strata were randomly selected from the department of education records in each state. The number of questionnairs sent out to each state is illustrated in Table I. A total of 126 questionnaires were mailed out. A list of schools surveyed can be found in Appendix D.

The Instrument

A list of possible questions for the questionnaire was compiled through the review of related literature, research studies in this area and from questions brought up in past course work at Indiana State University and Oklahoma State University. Through discussion with two professors in the Industrial Arts Department of Oklahoam State University additional questions were identified.

A list of possible items was then screened by determining each item's relevance to the original research questions. A prototype instrument was then developed and submitted to a school safety expert, an industrial arts education professor and a research expert for review and recommendations. These recommendations were considered in light of the research questions, and necessary changes were made.

A pilot study was conducted using five industrial arts woodworking teachers not surveyed in the study. The information gained through the pilot study was then used to make the final revisions in the instrument (see Appendix B).

TABLE I

NUMBER OF QUESTIONNAIRES MAILED

Size	New Jersey	Indiana	Oklahoma
Small Schools	14	14	14
Medium Schools	14	14	14
Large Schools	14	14	14
Total	42	42	42

The final revision used to gather the data was a modified closed questionnaire. The questionnaire consisted of a core of 27 questions applied to 18 different tools and machines. There was also a space provided for the respondent to make additional comments.

Collection of Data

The data for this study was obtained by mailing the study questionnaire to the respective schools. A cover letter was attached explaining the purpose of the study and the method of responding (See Appendix A). The instrument was mailed to the woodshop teachers of the schools in the sample.

The first mailing was made on October 1, 1983. Plans were made to send a follow-up reminder card to non-respondents after three weeks on October 22, 1983 (See Appendix A). Since a return of 75 percent was desired and only 52 percent of the schools returned the questionnaire after the first mailing and first follow-up it was decided to send the non-respondents another copy of the questionnaire and a new cover letter (See Appendix A). The second mailing was made on November 1, 1983 and a second follow-up care was mailed three days later on November 4, 1983 (See Appendix A). After the four mailings a return of 80 percent was accomplished.

A school profile section was included in the instrument to obtain background information on schools for the purpose of comparison. A list of comments returned by teachers will be found in Appendix C.

Treatment of Data

The data collected from the 101 returned questionnaires was used to

answer the research questions. The participants' responses were analyzed with descriptive statistics and Chi-square. The Chi-square was used to determine if there were significant differences among the variables. A probability level of 0.05 was used to determine the statistical significances for each Chi-square obtained.

CHAPTER IV

RESULTS

The purpose of this study was to determine what machine or tool is involved in the most injuries and the time of year and class level that injuries occur most often in high school industrial arts woodshops. It also was the intent of this study to determine the type of injury that most often occurs in the woodshop.

This study was designed to answer the following research questions: (1) What machine, tool or situation is involved in the injury of most students in the high school industrial arts woodshop? (2) What type of injury occurs most often in the high school industrial arts woodshop? (3) What time of year do most injuries occur in the high school industrial arts woodshop? (4) In what class level do most injuries occur in the high school industrial arts woodshop? and (5) In what size schools do most injuries occur in the high school industrial arts woodshop?

The data for this study was obtained from a mail survey of 126 high schools in Indiana, New Jersey, and Oklahoma. A stratified random sample was used.

The response rate selected for the study was 75 percent. The response rates by school category are listed in Table II. A return of 80.16 percent was obtained after two mailings and two follow-up cards were mailed out.

This chapter is organized into five sections. The data found in

TABLE II

DISTRIBUTION OF RESPONDING SCHOOLS

Category	Number of Schools Contacted	Number of Schools Participating	Percent Participating
Small Schools (1-500 enrollment)	42	36	85.71
Medium Schools (501-1,000 enrollment)	42	33	78.57
Large Schools (over 1,001 enrollment)	42	32	76.19
Total	126	101	80.16

each section is directly related to a specific research question. The sections are as follows: (1) Data related ot machine, tool or situation involved in the most injuries, (2) Data related to type of injury that most often occurs, (3) Data related to time of year most injuries occur, (4) Data related to class level most injuries occur, and (5) Data related to the size school most injuries occur. An instrument containing the combined data from the 101 participating schools are located in Appendix E.

Data Related to Machine, Tool or Situation Involved in the Most Injuries

The questionnaire listed the machines, portable electric tools, and hand tools as three different sections. The respondents indicated the number and type of injury or injuries involving each machine or tool. In the three year period selected for the study there were 498 injuries in the 101 participating schools. There were 333 of the 498 injuries of 66.87 percent of all injuries reported involving machines.

Table III summarizes the injuries involving machines. All 101 participating schools had at least one bandsaw. The table saw, lathe, and drill press could be found in 100 of the 101 schools. Only 64 schools had at least one shaper.

A total of 17.4 percent of all injuries reported in the survey involved the band saw. The responding schools reported 87 injuries involving the band saw. The sanding machines were involved in 74 injuries (14.8 percent of all injuries) and the table saw had 66 reported injuries (13.25 percent of all injuries). The machines with the least reported injuries were the shaper with four (.80 percent of all injuries), radial

TABLE III

SUMMARY OF INJURIES INVOLVING MACHINES

Machine	Number of schools that have machines	Observed frequency number of injuries involving machines	Expected frequency	Chi^2	Percent of injuries involving machines	Percent of all reported injuries
Bandsaw	101	87	33.76	83.9	26.12	17.40
Sanding Machine	95	74	31.76	56.16	22.22	14.85
Table Saw	100	66	33.43	31.70	19.71	13.25
Lathe	100	27	33.43	1.237	8.10	5.42
Jointer	96	27	32.09	.809	8.10	5.42
Drill Press	100	17	33.43	8.0	5.10	3.41
Jig Saw	94	10	31.32	14.60	3.00	2.00
Grinder	97	9	32.43	16.92	2.70	1.80
Radial Arm Saw	76	6	25.40	14.82	1.80	1.20
Shaper	64	6	21.39	11.07	1.80	1.20
Surfacer	73	4	24.40	17.06	1.20	.80

Sum of Chi^2 = 256.2
df= 10 (is sufficient)

arm saw and the sharper each accounted for six injuries (1.20 percent of all injuries).

The observed and expected frequencies of injuries are listed in Table III. A Chi-square of 256.2 shows there is a significant difference between the expected and observed frequencies with 10 degrees of freedom at the .05 level.

Table IV summarizes the injuries involving portable electric tools. The drill was the only tool in this section that all 101 schools had There were 98 schools using a router, 91 used a jig saw and 78 schools used a circular saw.

There were 27 injuries involving portable electric tools. This accounted for 5.43 percent of all injuries reported. The jig saw was involved in nine injuries, the router and drill were involved in seven injuries each and the circular saw was involved in four injuries.

The observed and expected frequencies for the portable electric tools can be found in Table IV. A Chi-square of 1.34 indicates there is no significant difference between the expected and observed frequencies on injuries, with three degrees of freedom at the .05 level.

Table V summarizes the injuries involving hand tools. All 101 participating reported having both hand saws and chisels.

There were 115 injuries involving hand tools. This accounted for 23.09 percent of all reported injuries. There were 46 reported injuries involving hand saws and 69 reported injuries involving chisels.

The observed and expected frequencies are shown in Table V. The Chi-square of 4.6 shows there are significant differences between the expected and observed frequencies of injuries with one degree of freedom at the .05 level.

TABLE IV

SUMMARY OF INJURIES INVOLVING PORTABLE ELECTRIC TOOLS

Portable electric tool	Number of schools that have tool	Observed frequency	Expected frequency	Chi^2	Percent of injuries on portable electric tool	Percent of all reported injuries
Circular Saw	78	4	5.72	.51	14.82	.80
Drill	101	7	7.42	.023	25.92	1.40
Jig Saw	91	9	6.67	8.1	33.34	1.80
Router	98	7	7.19	.005	25.92	1.40

Sum of Chi^2 = 1.348
df = 3 (is not significant)

TABLE V

SUMMARY OF INJURIES INVOLVING HAND TOOLS

Tool	Number of Schools that have hand tools	Observed frequency	Expected frequency	Chi^2	Percent of injuries on hand tools	Percent of all reported injuries
Saws	101	46	57.5	2.3	40	9.23
Chisels	101	68	57.5	2.3	60	13.85

Sum of $Chi^2 = 4.6$
df = 1 (is significant)

There were 23 injuries reported in the "other" column of the instruments. These 23 injuries accounted for 4.61 percent of all injuries reported.

Table VI summarizes the injuries involved in each category. Machines were involved in 23.09 percent of all injuries; portable electric tools were involved in 5.43 percent of all injuries and other situtaitons were involved in 4.61 percent of all injuries.

Data Related to Type of Injuries

The respondents were asked to indicate what part of the body was injured and the severity of the injuries. A Chi-square comparison was not used with this data. Table VII contains the distribution of injuries according to severity. There were 363 minor, 117 serious, 18 catastropic, and no fatal injuries reported. Three point sixty-two percent of all injuries reported were castrophic, 23.49 percent reported were serious and 72.89 percent of all injuries reported were minor.

The questionnaire listed 11 parts of the body and a column designated "other" for any injuries or parts of the body not listed. The data from this section is to determine which part of the body is injured most often. The distribution of injuries according to body part is found in Table VIII. The finger was the most injured part of the body. It was reported injured 424 times, 85.14 percent of all injuries were finger injuries. There were 18 reported injuries on the arm (3.61 percent). The head and eye each had 16 reported injuries (3.22 percent each). The wrist was the only other part of the body receiving more than one percent of the injuries; the wrist received 13 injuries (2.61 percent). Three parts of the body had no reported injuries: the ear, lungs and back.

TABLE VI

SUMMARY OF INJURIES BY CATEGORY

Category	Number of injuries	Percent of all injuries
Machine	333	66.87
Portable electric tool	27	5.43
Hand tools	115	23.09
Other	23	4.61
Total	498	100.00

TABLE VII

DISTRIBUTION OF INJURIES ACCORDING TO SEVERITY

Severity of injury	Number of injuries	Percent of total injuries
Minor	363	72.89
Serious	117	23.49
Catastrophic	18	3.62
Fatal	0	0

TABLE VIII

DISTRIBUITON OF INJURIES ACCORDING TO BODY PART

Body part injured	Number of injuries reported	Percent of all reported injuries
Head	16	3.22
Eye	16	3.22
Ear	0	0
Lung	0	0
Back	0	0
Arm	18	3.61
Wrist	13	2.61
Finger	424	85.14
Leg	4	.80
Foot	2	.40
Toe	2	.40
Other	3	.60
Total	498	100.00

Data Related to Time of Year

Since all schools do not start and finish the school year in the same month it was decided not to use Chi-square comparison with this data. Table IX illustrates the distribuiton of injuries per group of months. The 11 likely months for the regular school year were divided into four groups. The following groups and data were used: 30.52 percent of all injuries (152) occurred in the months of August, September, and October; 35.55 percent of all injuried (172) occurred in the months of November, December, and January; 24.89 percent of all injuries (124) occurred in the months of February, March, and April; and only 10.04 percent of all injuries (50) occurred in May and June.

Data Related to Injuries per Class Level

In high school, grades nine through 12, it was determined that four levels of woodshop would be adequate for the survey. This section's data deals with the frequency of injuries in the four levels of woodshop. All 101 schools participating in the study had Woods I, 95 schools had Woods II, 68 schools had Woods III, and 43 schools had Woods IV.

Table X is a summary of injuries according to class level. There were 236 injuries reported in Woods I class which was 47.39 percent. of all injuries reported. Woods II had 150 injuries reported, Woods III had 80 injuries reported and Woods IV had 32 injuries reported.

There was an average of 2.33 injuries per school offering Woods I, an average of 1.57 injuries per school offering Woods II, an average of 1.17 injuries per school offering Woods III and an average of .74

TABLE IX

DISTRIBUTION OF INJURIES ACCORDING TO GROUPS OF MONTHS

Group of Months	Number of injuries	Percent of all reported injuries
August September October	152	30.52
November December January	172	34.55
February March April	124	24.89
May June	50	10.04

TABLE X

SUMMARY OF INJURIES ACCORDING TO CLASS LEVEL

Class Level	Number of schools with class level	Observed frequency	Expected frequencies	Chi^2	Percent of total reported injuries	Average of number of injuries per school
Woods I	101	236	164	31.60	47.49	2.33
Woods II	95	150	154	.10	30.12	1.57
Woods III	68	80	130	19.23	16.05	1.17
Woods IV	43	32	50	6.48	6.44	.74

Sum of Chi^2 = 57.41
df = 3 (is significant)

injuries per school offering Woods IV.

Table X also lists the observed and expected frequencies for each level. A Chi-square of 57.41 shows there is a significant difference between the expected and observed frequencies of injuries with three degrees of freedom at the .05 level.

Data Related to Size of Schools

Of the 101 schools participating, 36 were small size (1-500 enrollment), 33 were medium size (501-1,000 enrollment), and 32 were large size (over 1,000 enrollment). Table XI is a summary of the injuries according to size of school.

There were 135 injuries (27.11 percent) in the small schools, 182 injuries (36.55 percent) in the medium schools, and 181 injuries (36.34 percent) reported in the large schools. The large schools averaged 5.65 injuries per school, the medium schools averaged 5.51 injuries per school, and the small schools averaged 3.75 injuries per school.

The observed and expected frequencies are listed in Table XI. A Chi-square of 15.46 shows there is a significant difference between observed and expected frequencies of injuries with two degrees of freedom at the .05 level.

TABLE XI

SUMMARY OF INJURIES ACCORDING TO SIZE OF SCHOOL

Size of School	Number of schools participating	Observed frequency	Expected frequencies	Chi^2	Percent of totals reported injuries	Average number of injuries per school
Small	36	135	177	9.96	27.11	3.75
Medium	33	182	162	2.46	36.55	5.51
Large	32	181	159	3.04	36.34	5.65

Sum of Chi^2 = 15.46
df = 2 (is significant)

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

The health and welfare of the individual is one of the main interests of society. Accident prevention programs have been developed for almost every facet of life. There is plenty of information concerning accident prevention for the woodshop teacher. However, there is little information concerning woodshop injuries available at this time.

The purpose of this study was to determine what machine or tool is involved in the most injuries and the time of year and class level that injuries occur most often in high school industrial arts woodshops. It also was the intent of this study to determine the type of injury that most often occurs in the woodshop.

The following research questions were based on the purpose of the study and were designed to facilitate the gathering and analysis of data. (1) What machine, tool or situation is involved in the injury of most students in the high school industrial arts woodshop? (2) What type of injury occurs most often in the high school industrial arts woodshop? (3) What time of year do most injuries occur in the high school industrial arts woodshop? (4) In what class level do most injuries occur in the high school industrial arts woodshop? and (5) (5) In what size school do most injuries occur in the high school industrial arts woodshop?

The data for this study was obtained from a mail survey of 126 high schools in Indiana, New Jersey and Oklahoma. A stratified random sample was used. The response rate selected for the study was 75 percent. A return of 80.16 percent was obtained after two mailings and two follow-up cards were sent out.

The data analysis was organized into five sections. The data presented in each section is directly related to a specific research question. The sections are as follows: Data related to machine, tool or situation involved in the most injuries, data related to type of injury that most often occurs, data related to time of year most injuries occur, data related to class level most injuries occur, and data related to the size of school where most injuries occur.

Findings

It was the fnding of this study that machines were involved in 66 percent of all injuries. The bandsaw was the machine, tool or situation involved in the most injuries, 87. The Chi-square comparison between frequency of injuries among the machines resulted in a significant difference. The bandsaw, the sanding machine, and the table saw were the only machines that were involved in more injuries than expected. Close examination of the data indicates that the bandsaw, the sanding machine and the table saw are the machines involved in the most injuries in high school industrial arts woodshops.

The Chi-square comparison among the frequencies of injuries involving portable electric tools resulted in no significant difference. Examination of the data indicates that portable electric tools are not involved in an overwhelming number of injuries. Five percent

of all injuries involved portable electric tools.

It was the finding of the study that 22 percent of all injuries involved hand tools. The Chi-square comparison between frequencies of injuries among hand tools resulted in a significant difference. An examination of the data reveals that chisels were involved in more injuries than expected.

A review of the data involved with this research question indicates that the bandsaw, 17 percent, the sanding machine, 14 percent, the chisels, 13 percent, the table saw, 13 percent, and the handsaws, 9 percent, were involved in the most injuries.

It was the finding of this study that 72 percent of all injuries reported were minor. The part of the body most often injured was the finger, 85 percent. The head, eye, and arm each were involved in a reported three percent of all injuries.

The greatest number of all injuries, 35 percent, were reported in November, December, and January. In August, September, and October 31 percent of the reported injuries occurred. Close examination of the data indicates that the first half of the school year has an increased number of injuries, 66 percent. The last five months had 34 percent of all injuries reported.

It was the findings of this study that 47 percent of all injuries occurred in Woods I while Woods II, Woods III and Woods IV combined had reported 53 percent of all injuries. The Chi-square comparison between the expected and observed frequencies of injuries reported resulted in a significant difference. Examination of this data indicates that Woods I is the level most injuries occur.

Large schools (36.3 percent) and medium schools (36.5 percent) had the most injuries. Medium schools had an average of 5.5 injuries per school year and the large schools had an average of 5.6 injuries per school. The small schools averaged 3.75 per school. The Chi-queare comparison among expected and observed frequencies of injuries reported resulted in a significant difference. Examination of the data indicates that medium and large schools had more injuries than statistically expected.

Conclusions

Based on the purpose of this study, research questions were formulated to provide a basis for collection and analysis of data. The following conclusions are based on the review of literature and the results of this study. The conclusions are organized in accordance with the research questions.

Research Question One

"What machine, tool, or situation is involved in the injury of most students in the high school industrial arts woodshop?"

Based on the findings it can be concluded that the bandsaw is the machine tool, or situation involved in the injury of most students in the high school industrial arts woodshop. But, it is also concluded that the sanding machines, the chisels, the table saw and the hand saws were involved in an increase among the injuries.

The bandsaw has a moving blade that can easily harm flesh. It is also one of the most frequently used machines in the shop. This researcher believes that the bandsaw is viewed by students and teachers as a safe machine. This may be the reasons why the bandsaw is the

machine tool or situation involved in the most injuries.

The sanding machines, the chisels, the table saw and the hand saws are used frequently in the industrial arts woodshop. The student's attitudes towards safety on these machines must improve before injury rates will decrease.

Research Question Two

"What type of injury occurs most often in the high school industrial arts woodshop?"

Based on these findings it can be concluded that finger injuries are the type of injuries that occur most often in the hgih school industrial arts woodshop. In operation or use of most tools and machines the finger is the part of the body closest to the cutting edge.

Research Question Three

"What time of the year do most injuries occur in the high school industrial arts woodshop?"

Based on these findings it can be concluded that most injuries occur in the first six months (first half) of the school year. This could be caused by the students' lack of woodworking experience and an increase in the use of tools and machines at the begining of the school year. Toward the end of the school year the emphais in the woodshop changes from machining wood to project assemble and wood finishing.

Research Question Four

"In what class level do most injuries occur in the high school industrial arts woodshop?"

Based on these findings it can be concluded that most injuries occur in Woods I level in the high school industrial arts woodshop. Students in Woods I have the least experience in the use of the tools and machines. It is the belief of this research that with more experience the student will become a safer worker. First year woods students are less confident of themselves and are not familiar with dangers of the tools and machines.

Research Question Five

"In what size schools do most injuries occur in the high school industrial arts woodshop?"

Based on these findings it can be concluded that most injuries occur in the large and medium size schools. This can be greatly contributed to the large number of students in each class and the fact that larger schools receive students from urban areas. Students in urban areas have less experince working with machines or tools.

Recommendations

1. This study found the bandsaw, the sanding machine, the chisel, the table saw and the hand saw were involved in the most injuries. Based on these findings it is recommended that:

1. High school industrial arts teachers should lead students to recognize that most injuries occur on the bandsaw, the sanding machine, the chisel, the table saw and the hand saw and get them to understand

how this information could affect them.

b. Safety should be stressed on all machines, tools or with extra emphasis on the bandsaw, the sanding machine, the chisel, the table saw, and the hand saw.

c. Industrial arts teacher educators should teach comprehensive safety programs with extra emphasis on the bandsaw, the sanding machine, the chisel, the table saw and the band saw.

2. This study found that the most injured part of the body was the finger. Based on these fndings it is recommended that:

a. Teachers should lead the students to recognize that the finger is the most injuried part of the body and why.

b. Industrial arts teacher educators should lead future industrial arts teachers to recognize that the finger is the most injured part of the body and why.

3. This study found that most injuries occurred in the first half of the school year. Based on these findings it is recommended that:

a. Teachers should stress safety throughout the school year with extra emphasis on the first half of the year. The use of safety tests or quizes during the first half of the school year may help the student develop a better safety attitude.

b. Industrial arts teacher educators should lead future teachers to recognize that more injuries occur during the first half of the school year and why.

4. This study found that most injuries occurred in Woods I. Based on these findings it is recommended that:

a. Teachers should stress safety through all levels of woodworking with extra emphasis on Woods I.

5. This study found that more injuries occurred in medium and large schools (501 or more enrollment). Based on these findings it is recommended that:

a. Teachers in medium and large schools stress safety and spend more time teaching safety rules.

b. Industrial arts teacher educators should lead future teachers to recognize that more injuries occur in medium and large schools.

It is the belief of this researcher that injuries would decrease if the following suggestions were considered: Safety inspections of tools, machines, and shop areas should be conducted regularly. All tools and machines should be properly guarded and maintained. Proper use of each tool and machine should be taught. Safety tests should be administered before a student can use a mchine. A strick accident prevention program should be followed. If industrial arts want to remain an attractive part of general education it must decrease the number of injuries occurring in its classes.

Recommendations for Further Study

1. This study did not include the machines of the injuries. (how they happen). It is recommended that further study be made to investigate the mechanics of injuries that occur in high school industrial arts woodshops.

2. This study did not determine what part of the body where most catastrophic, serious and minor injuries occur. It is recommended that further study be made to investigate the part of body injured related to severity.

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APPENDIXES

APPENDIX A

COVER LETTERS AND FOLLOW-UP CARDS

Oklahoma State University

SCHOOL OF OCCUPATIONAL AND ADULT EDUCATION

STILLWATER, OKLAHOMA 74078
CLASSROOM BUILDING 406
(405) 624-6275

October 1, 1983

Dear Woodworking Teacher.

The Department of Industrial Arts Education at Oklahoma State University, Stillwater, Oklahoma, is conducting a study of injuries that occur in the woodshop. It is the intent of this study to determine the machine or tool, the time of year and class level that injuries occur most often in the woodshop. It is also the intent of this study to determine what type of injury occurs most. The information obtained from this study will be able to help our future woodshop teachers become more safety educated.

When compiling this questionnaire, feel assured that your answers will be held in the strictest confidence and will only appear in composite form with all other schools. The number on the questionnaire is there for response control purposes only.

While answering this questionnaire please include all injuries occuring from August 1979 until August 1983. If you have any comments or additional information, please feel free to write them in the space provided or on an additional piece of paper and return it with the questionnaire. If you would like a copy of the results of this study, please enclose your name and address on a seperate card.

Your cooperation in completing and returning this questionnaire is greatly appreciated.

Sincerely,

Dr. John B. Tate
Departmental Approval

Bruce Baumgartner

Oklahoma State University

SCHOOL OF OCCUPATIONAL AND ADULT EDUCATION

STILLWATER, OKLAHOMA 74078
CLASSROOM BUILDING 406
(405) 624-6275

November 30, 1983

Dear Woodworking Teacher:

The Department of Industrial Arts Education at Oklahoma State University, Stillwater, Oklahoma, recently sent you a questionnaire and our records show we have not received a response. We have enclosed another questionnaire for you to fill out and return. The questionnaire is designed to collect data that will help our future woodshop teachers become more safety educated. It is the intent of this study to determine the machine or tool, the time of year and class level injuries occur most often in the woodshop. Please help us educate our future teachers. Return this questionnaire in the stamped envelope provided.

When compiling this questionnaire, feel assured that your answers will be held in the strictest confidence and will only appear in composite form with all other schools. The number on the questionnaire is there for response control purposes only.

While answering this questionnaire please include all injuries occuring form August 1979 until August 1983. If you have any comments or additional information, please feel free to write them in the space provided or on an additional piece of paper and return it with the questionnaire. If you would like a copy of the results of this study, please enclosed your name and address on a seperate card.

Your cooperation in completing and returning this questionnaire is greatly appreciated.

Sincerely,

Dr. John B. Tate
Departmental Approval

Bruce Baumgartner

Dear Woodshop Instructor:

You should have recently received a questionnaire concerning 'Safety in the Woodshop'. All responses given to the questionnaire are kept confidential. I would appreciate you returning the questionnaire promptly if you have not done so at this time.

If you have any questions please contact me.

Sincerely,

Bruce R Baumgartner

Bruce Baumgartner
O: 405-624-7414
H: 405-624-8657

Dear Woodshop Instructor,

You recently received a questionnaire concerning 'Safety in the Woodshop'. If you have not received this or have misplaced the questionnaire please contact me.

I would appreciate you returning the questionnaire promptly in the envelope that was provided.

If you have any questions please feel free to contact me.

Sincerely,

Bruce Baumgartner

Bruce Baumgartner
O: 405-624-7414
H: 405-624-8657

APPENDIX B

INSTRUMENT

YOUR ANSWERS WILL BE HELD IN THE STRICTEST CONFIDENCE AND WILL ONLY APPEAR IN COMPOSITE FORM WITH OTHER SCHOOLS.

INSTRUCTIONS

Place the number of machines or tools your school has in its wood shop in the box to the left of the list of machines. In the appropriate boxes to the right of the machine or tool place the number of injuries that occurred in your school's wood shop since 1978.

Machines in Shop		Fatal Injuries	Catastrophic Injuries	Serious Injuries	Minor Injuries	Head Injuries	Eye Injuries	Ear Injuries	Lung Injuries	Back Injuries	Arm Injuries	Wrist Injuries	Finger Injuries	Leg Injuries	Foot Injuries	Toe Injuries	Other Injuries
	MACHINES																
	Band Saw																
	Drill Press																
	Grinder																
	Jig Saw																
	Jointer																
	Lathe																
	Radial Arm Saw																
	Sanding Machines																
	Shaper																
	Surfacer																
	Table Saw																
	PORTABLE ELECTRIC																
	Circular Saw																
	Drill																
	Jig Saw																
	Router																
	HAND TOOLS																
	Saws																
	Chisels																
	Other																

YOUR ANSWERS WILL BE HELD IN THE STRICTEST CONFIDENCE AND WILL ONLY APPEAR IN COMPOSITE FORM WITH ALL OTHER SCHOOLS.

INSTRUCTIONS

Please place the appropiate number in the space provided.

1. How many levels of woodworking in the school? ____
2. Number of grades in the school? ____
3. Number of injuries in Woods I? ____
4. Number of injuries in Woods II? ____
5. Number of injuries in Woods III? ____
6. Number of injuries in Woods IV? ____
7. Number of injuries in Aug., Sept., and Oct.? ____
8. Number of injuries in Nov., Dec., and Jan.? ____
9. Number of injuries in Feb., March, and April? ____
10. Number of injuries in May and June? ____

DEFINITION OF TERMS

Fatal injury: an injury occurring in the wood shop that is directly responsible for the death of a student.

Catastrophic injury: an injury occurring in the wood shop that is directly responsible for loss of function or permanent damage of a part of the body (arm, finger, eye, etc.)

Serious injury: an injury obtained in the wood shop requiring out-of-school medical attention (broken bone, stiches,etc.)

Minor injury: an injury obtained in the wood shop requiring in-school first aid (cut, scratch, etc.)

COMMENTS

APPENDIX C

PARTICIPANT'S COMMENTS

1. A student slipped and cut his finger with a X-acto knife. no stiches required.
2. Minor injuries occur often, i.e.splinters, small abrasions, small cuts etc.
3. We feel we have a strong program of lectures on safety and the operation of each machine in the shop. This program is repeated each year, and usually lasts the beginning five weeks of the school year.
4. On the minor injury related to the router, the student was wearing safety glasses with side shields and a full face shield. Upon completion of task, he proceeded to brush his hair and upper body and the sawdust that was in his hair got into his eyes. He was sent to the nurse for eye irritation.
5. Both injuries reported required stiches.
6. The minor finger injuries I reported were "burns" on the belt sander.
7. Most minor injuries are during the first three months.
8. I am very strict on safety rules and it has helped to keep injuries form becoming serious.
9. Finger got into belt sander - took finger nail off and the doctor dressed it up.
10. The student was cutting a scrap piece of lathe work on the band saw. The round end was almost 1¼" by 3" diameter. He was trying to cut the piece in half using the band saw. Cut his finger when the wood rolled around. Received 5 stiches. The student admitted he was wrong.

APPENDIX D

A LIST OF SCHOOLS SURVEYED

INDIANA

Hammond High	Hammond, IN
Noblesville High	Nobelsville, IN
East Central High	Brookville, IN
Mooresville High	Mooresville, IN
Bloomington High North	Bloomington, IN
Arsenal Technical High	Indianapolis, IN
Pike Central	Petersburg, IN
Wallace Lew High	Gary, IN
Lebanon Senior High	Lebanon, IN
Terre Haute South Vigo High	Terre Haute, IN
Floyd Central High	New Albany, IN
Jeffersonville High	Jefferson, IN
Merrillville Senior High	Merrillville, IN
Griffith Senior High	Griffith, IN
North Newton HIgh	Morocco, IN
Eastbrook High	Marion, IN
Mississinewa High	Gas City, IN
Twin Lakes Senior High	Monticello, IN
Lakeland High	Lagrange, IN
Silver Creek High	Sellersburg, IN
Kankakee Valley High	Wheatfield, IN
Marion-Adams High	Sheridan, IN
Hamilton Heights High	Arcadia, IN
New Washington High	New Washington, IN
Barr Reeve Jr.- Sr. High	Montgomery, IN
Warren Central	Indianapolis, IN

Argos Community Jr. - Sr. High	Argos, IN
Adams Central High	Monroe, IN
Rising Sun High	Rising Sun, IN
Westville High	Westville, IN
West Central Senior High	Franceville, IN
Wes-Del Senior High	Gaston, IN
Linton-Stockton High	Linton, IN
Jac-Cen-Del Jr. - Sr. High	Osgood, IN
Cannelton High	Cannelton, IN
Breman Senior High	Breman, IN
Orleans High	Orleans, IN
Dekalb High	Waterloo, IN
Batesville High	Batesville, IN
Alexandria-Monroe High	Alexandria, IN
Theodore Roosevelt High	East Chicago, IN
Zionsville Community High	Zionsville, IN

OKLAHOMA

Bixby High School	Bixby, OK
Claremore Sr. High	Claremore, OK
Cushing High	Cushing, OK
Durant High School	Durant, OK
Guthrie High School	Guthrie, OK
McAlester High	McAlester, OK
Olney High	Coalgate, OK
Achille High School	Achille, OK

Apache High	Apache, OK
Broken Bow High School	Broken Bow, OK
Calera High School	Calera, OK
Cashion High	Cashion, OK
Goodwell High	Goodwell, OK
Hobart High	Hobart, OK
El Reno Jr. -Sr. High	El Reno, OK
Choctaw High	Choctaw, OK
Bethany Jr. - Sr. High	Bethany, OK
Enid High	Enid, OK
Lawton Eisenhower High	Lawton, OK
Miami High	Miami, OK
Midwest City High	Midwest City, OK
Moore High	Moore, OK
Mustang High	Mustang, OK
Oklahoma City Douglas High	Oklahoma City, OK
Stillwater High	Stillwater, OK
Tulsa Booker T. Washington High	Tulsa, OK
Tahlequah High	Tahlequah, OK
Hooker Jr. - Sr. High	Hooker, OK
Hydro High	Hydro, OK
Inola High	Inola, OK
Mounds High	Mounds, OK
Okay Jr. _ Sr. High	Okay, OK
Quapaw High	Qaupaw, OK
Tulsa McLain High	Tulsa, OK

Sharon-Mutual High	Mutual, OK
Oologah High	Oologah, OK
Ponca City High	Ponca City
Silo High	Durante, OK
Sperry High	Sperry, OK
Woodward High	Woodward, OK
Wellston High	Wellston, OK
Warner Jr. - Sr. High	Warner, OK 74469

NEW JERSEY

Freehold High	Freehold, NJ
Florence Township Memorial High	Florence, NJ
Manalapan High	Englishtown, NJ
Maple Sahde High	Maple Shade, NJ
J.P. Stevens High	Edison, NJ
Eastern Regional School	Gibbsboro, NJ
Manchester Regional High	Haledon, NJ
South Hunterdon Regional High	Lambertville, NJ
Cumberland Regioanl High	Seabrook, NJ
Montgomery High	Skillman, NJ
South River High	South River, NJ
Kingsway Regional High	Swedesboro, NJ
Ewing High	Trenton, NJ
Warren Hills Regional High	Washington, NJ
Haddon Township School	Westmont, NJ
Arts High School	Newark, NJ
Neptune High	Neptune , NJ
Metuchen High	Metuchen, NJ

Cherokee High	Marlton, NJ
Southern Regional High	Manahawkin, NJ
Bayley-Ellard High	Madison, NJ
Salem High	Salem, NJ
Riverside High	Riverside, NJ
Ridgewood High	Ridgewood, NJ
Ridgefield Memorial High	Ridgefield, NJ
Randolph High	Randolph, NJ
West Essex High	North Caldwell, NJ
Kittatinny Regional High	Newton, NJ
Al Johnson Regional High	Clark, NJ
Deptford HIgh	Deptford, NJ
Clifton Senior High	Clifton, NJ
Cherry Hill East High	Cherry Hill, NJ
Lower Cape Regional High	Cape May, NJ
Butler High	Butler, NJ
Burlington City High	Burlingotn, NJ
Bordentown High	Bordentown, NJ
Bergenfield High	Bergenfield, NJ
Hillsbrough High	Bellemead, NJ
Ridge High	Basking Ridge, NJ
Asbury Park High	Asbury Park, NJ
Holyspirt High	Absecon, NJ
Northern Highlands High	Allendale, NJ

APPENDIX E

AN INSTRUMENT CONTAINING THE COMBINED DATA FROM THE PARTICIPATING SCHOOLS

YOUR ANSWERS WILL BE HELD IN THE STRICTEST CONFIDENCE AND WILL ONLY APPEAR IN COMPOSITE FORM WITH OTHER SCHOOLS.

INSTRUCTIONS

Place the number of machines or tools your school has in its wood shop in the box to the left of the list of machines. In the appropriate boxes to the right of the machine or tool place the number of injuries that occurred in your school's wood shop since 1978.

Machines in Shop		Fatal Injuries	Catastrophic Injuries	Serious Injuries	Minor Injuries	Head Injuries	Eye Injuries	Ear Injuries	Lung Injuries	Back Injuries	Arm Injuries	Wrist Injuries	Finger Injuries	Leg Injuries	Foot Injuries	Toe Injuries	Other Injuries
	MACHINES																
	Band Saw		5	23	59								89				
	Drill Press			5	12		1				3	1	12				
	Grinder		1	4	4		4					1	4				
	Jig Saw				10						1		9				
	Jointer		1	16	10	1							24	2			
	Lathe			7	20	8					1	1	15		1		1
	Radial Arm Saw		1		5								6				
	Sanding Machines		1	3	70	1						2	71				
	Shaper		2	3	1		1						5				
	Surfacer				4		2						2				
	Table Saw		6	31	29		1				1		62				2
	PORTABLE ELECTRIC																
	Circular Saw		1	1	2								3			1	
	Drill				7	1					1	1	4				
	Jig Saw			2	7		1					1	7				
	Router			6	1		4						3				
	HAND TOOLS																
	Saws			1	45							4	42				
	Chisels			10	59	1					7	2	57	1	1		
	Other			5	18	4	2				4		11	1	1		
	TOTALS	0	18	117	363	16	16	0	0	0	18	14	424	4	2	2	3

YOUR ANSWERS WILL BE HELD IN THE STRICTEST CONFIDENCE AND WILL ONLY APPEAR IN COMPOSITE FORM WITH ALL OTHER SCHOOLS.

INSTRUCTIONS

Please place the appropiate number in the space provided.

		Number of injuries per school
1.	How many levels of woodworking in the school?	____
2.	Number of grades in the school?	____
3.	Number of injuries in Woods I?	236
4.	Number of injuries in Woods II?	150
5.	Number of injuries in Woods III?	80
6.	Number of injuries in Woods IV?	32
7.	Number of injuries in Aug., Sept., and Oct.?	152
8.	Number of injuries in Nov., Dec., and Jan.?	172
9.	Number of injuries in Feb., March, and April?	124
10.	Number of injuries in May and June?	50

DEFINITION OF TERMS

Fatal injury: an injury occurring in the wood shop that is directly responsible for the death of a student.

Catastrophic injury: an injury occurring in the wood shop that is directly responsible for loss of function or permanent damage of a part of the body (arm, finger, eye, etc.)

Serious injury: an injury obtained in the wood shop requiring out-of-school medical attention (broken bone, stiches,etc.)

Minor injury: an injury obtained in the wood shop requiring in-school first aid (cut, scratch, etc.)

COMMENTS

VITA 2

Bruce Robert Baumgartner

Candidate for the Degree of

Master of Science

Thesis: ANALYSIS OF INJURIES IN THE INDUSTRIAL ARTS WOODSHOP

Major Field: Industrial Arts Education

Biographical:

Personal Data: Born in Haledon, New Jersey, November 2, 1960, the son of Mr. and Mrs. R. G. Baumgartner; married to Linda June 6, 1982.

Education: Graduated from Manchester Regional High School, Haledon, New Jersey in June, 1978; received a Bachelor of Science degree in Industrial Arts Education from Indiana State University, Terre Haute, Indiana in 1982; completed requirements for a Master of Science degree in Industrial Arts Education at Oklahoma State University in May, 1984.

Professional Experience: Employed as a graduate teaching assistant in the Industrial Arts Education department, Oklahoma State University, Stillwater, Oklahoma, August, 1982 to present.

Professional Organizations: Epsilon Pi Tau, Kappa Delta Pi.